

REMARKS

The Office Action of March 20, 2008 has been reviewed and the Examiner's comments carefully considered. Claims 25-47 were previously pending in the present application. Claims 35 and 36 are cancelled herewith and claim 48 has been added. Further, claims 25, 34 and 39 are amended herewith in accordance with the originally filed specification. No new matter has been added. Thus, claims 25-34 and 37-48 are currently pending in this application and claim 25 is in independent form.

35 U.S.C. §112, Second Paragraph, Rejections

Claims 25-47 stand rejected under 35 U.S.C. §112, second paragraph, for indefiniteness. The Examiner asserts that in claims 25 and 39, the fragment "average molecular weight" is indefinite, since the type of molecular weight (number or weight) is not defined. The fragment has been amended herewith to read "weight-average molecular weights" in claims 25 and 39. Further, the Examiner asserts that the fragment "a reaction temperature of from 70 to 160°C, such as from 95 to 100°C" in claim 34, is indefinite since it is not clear what temperature range is being claimed. The phrase "such as from 95 to 100°C" has been deleted from claim 34 and new claim 48 has been added to embrace the deleted language accordingly.

In light of the foregoing, reconsideration and withdrawal of these claim rejections are respectfully requested.

35 U.S.C. §103 Rejections

Claims 25-37 and 39-47 stand rejected under 35 U.S.C. §103(a) for obviousness over WO 02/40564 and its equivalent U.S. Patent Application Publication No. 2004-0024131 to Borner et al. (hereinafter, "Borner") in combination with U.S. Patent No. 2,473,463 to Adams (hereinafter, "Adams"). Further, claim 38 stands rejected under 35 U.S.C. §103(a) for obviousness over Borner in combination with Adams and U.S. Patent No. 5,206,066 to Horacek (hereinafter, "Horacek").

Borner describes the synthesis and processing of 2,4-diamino-1,3,5-triazine aldehyde resins. Substituted 2,4-diamino-1,3,5-triazines are reacted with an aldehyde, such as formaldehyde, to produce unetherified aldehyde-triazine resins in a basic environment. In a second step, the unetherified resin is then etherified with a C1-C12 alcohol under acidic

conditions. The such obtained etherified amino resins are precured at temperatures between 160 to 200°C.

According to Example 1 of Borner, the etherified resin obtained in the second process step is stabilized by neutralization with KOH. The neutralization is accompanied by salt formation which is separated from the resin by distillation and addition of butanol. Due to the insolubility of the salt in butanol, a separation is achieved. Butanol is not a reactant and thus a re-etherification does not occur. The such obtained resins are only partially etherified and still contain -NH-CH₂-O-CH₂-NH- groups. It is only after the precuring process at 160-200°C that these groups are removed, though not completely.

As is known and appreciated by one of ordinary skill in the art -NH-CH₂-O-CH₂-NH- groups are unstable and easily separate formaldehyde, which is then released from the resin. The separation of formaldehyde causes the formation of microcracks in the cured resins (page 1, lines 25-30 of the present application as filed). The release of formaldehyde is also harmful for humans. These disadvantages are solved, however, by the present invention.

The presently claimed invention provides a process where, in a first step, melamine and formaldehyde are reacted in an alcoholic solution forming an etherified melamine precondensate, which is, in a second step after concentration, transesterified with a second alcohol of a higher molecular weight. By applying this process, a resin is obtained which is free of -NH-CH₂-O-CH₂-NH- groups. Due to the re-etherification of the resin with a high molecular weight alcohol, all -NH-CH₂-O-CH₂-NH- groups are eliminated. Furthermore, due to the synthesis of the precondensate in an alcoholic, neutral solution in the first step, the formation of salt is avoided. Thus, in contrast to Example 1 of Borner, no salt separation has to be carried out. In light of the foregoing differences, the present invention is novel and not obvious over the teachings of Borner.

Adams teaches a process for preparing liquid alkylated melamine-formaldehyde compositions. Methanol, melamine, and formaldehyde are brought to reaction in a first step and the obtained condensate is transesterified with propanol or butanol in a second step (column 1, lines 10-30, and Examples 3-5 of Adams). It is crucial that no gel formation or precipitation occurs during the reaction (column 4, lines 17-28 of Adams) so the formed condensate can be used as a liquid composition (column 6, lines 4-7 of Adams).

In order to avoid gel formation or precipitation, the reaction of melamine, formaldehyde and methanol is carried out in a distillation process whereby butanol is added at the same rate as the volatile compounds methanol and water are removed from the reaction mixture (Example 3 of Adams). This ensures a constant concentration of the reactants in the reaction mixture. Thus, according to Adams, an enrichment or concentration of the precondensate is avoided. By studying Adams, a person of ordinary skill in the art would come to the conclusion that a transesterification reaction can solely be carried out in a liquid environment.

According to the present invention, however, the enrichment of the precondensate to a concentration of about 95 to 99% by weight is crucial for a complete transesterification of the etherified precondensate. The concentrated precondensate allows the use of a highly concentrated alcohol for transesterification. Furthermore, the split off and removal of excess formaldehyde is promoted. The reverse reaction of formaldehyde with the precondensate is avoided. Thus, only due to the enrichment process of the precondensate is a complete removal of $\text{-NH-CH}_2\text{-O-CH}_2\text{-NH-}$ groups achieved. The enrichment is also absolutely necessary for the reaction of the increased-concentration melamine resin precondensate in a mixer, such as a kneader. For a reaction in a mixer, especially in a kneader, it is extremely advantageous if the mixture is present in the form of a highly viscous mass and not in the form of a liquid as in Adams. As such, Adams teaches away from the present invention. In light of the foregoing differences, the present invention is novel and not obvious over the teachings of Adams.

Furthermore, the combined teachings of Borner and Adams would not render the present invention obvious to one of ordinary skill in the art. Such a combination would lead one, at most, to a process comprising the steps of forming an etherified resin and optionally enriching the same according to Borner, followed by its dilution and transesterification with butanol according to Adams, whereby the transesterified resin has to be maintained in a liquid form. However, such a process would not provide a completely transesterified resin which is free of $\text{-NH-CH}_2\text{-O-CH}_2\text{-NH-}$ groups as described above. As such, one of ordinary skill in the art would not consult the teachings of Borner in combination with Adams in order to provide the process of the present invention.

Horacek teaches melamine resins comprising at least partially etherified melamine resin with a molar ratio of melamine to formaldehyde of 1:(5 to 6) and polyester- or polyether-diols. The resin is characterized by a high formaldehyde content. It is known to a person of ordinary skill in the art that such resins show very little crosslinking. Therefore, the addition of a strong acid, such as p-toluene-sulfonic acid, is necessary (column 3, lines 11-15 of Horacek) in order to accelerate the reaction during modification of the melamine resin with the diols. Such aggressive reaction conditions, however, lead to a non-controllable reaction; a directed buildup in order to obtain polymers with a molecular weight of 500 to 50,000 is not possible.

In contrast to Horacek, the presently claimed process uses a lower melamine/formaldehyde ratio of 1:2 to 1:4. Such precondensates are characterized by a higher degree of crosslinking. This allows the conduction of the transesterification in the second step to be carried out at non-aggressive, slightly basic conditions (see examples in the application as filed). Such conditions allow for a manageable polymer buildup. As such, the present invention is also novel and not obvious over the teaching by Horacek.

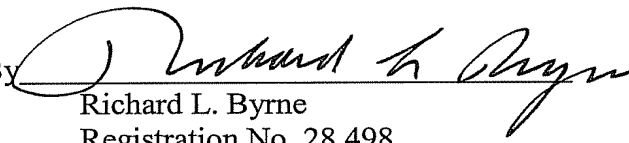
Furthermore, the combined teachings of Borner, Adams and Horacek would not render the present invention obvious to one of ordinary skill in the art. Such a combination would lead at the most to a process comprising the synthesis of an etherified resin (Borner) followed by a transesterification with diols in the presence of a strong acid (Horacek). In such a process, however, the degree of crosslinking would outweigh the transesterification. Thus, the transesterification would be strongly hampered. Furthermore, such a process would not promote the controllable buildup of a resin with a molecular weight of 500 to 50,000 due to the preferred crosslinking. As such, one of ordinary skill in the art would not consult the teachings of Borner and Adams in combination with Horacek in order to provide the process of the present invention.

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In light of the amendments and arguments contained herein, Applicants believe that claims 25-34 and 37-47 are patentable over the cited prior art and in condition for allowance. Reconsideration of the rejections and allowance of all pending claims 25-34 and 37-48 are respectfully requested.

Respectfully submitted,
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